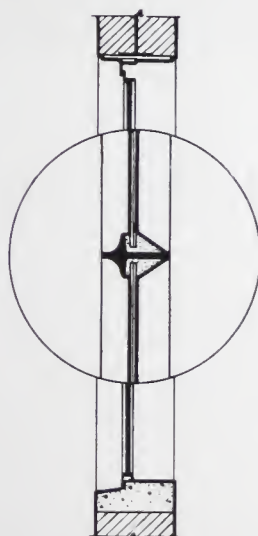# INSULUX

SUBJECT

HEATING

PROBLEM

1 HEAT LOSS
2 DRAFTS NEAR OUTSIDE WALL
3 CONDENSATION
4 EXCESSIVE COOLING LOAD

ANSWER

INSULUX
GLASS BLOCK

In order to appreciate fully the problem of heating or cooling industrial buildings, it is necessary to consider all related factors which directly or indirectly affect costs. Heat gain or loss through glass areas, the reduction of condensation and the elimination of drafts are all related to the installation cost and operation costs of either heating or cooling equipment and vary considerably depending upon the use of ordinary window sash or Glass Block.
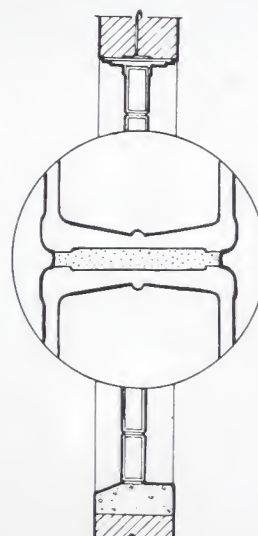
COMPARISON OF HEAT LOSS BETWEEN SASH AND BLOCK

PROBLEM 1

SASH
Enlarged section through single glazed factory sash.

GLASS BLOCK
Enlarged section through Insulux Glass Block panel.

These cross sections show the construction of two light transmitting building materials—an ordinary single glazed window and a glass block panel. The purpose of both of these constructions is to transmit light and to act as a barrier to the weather. A comparison of the enlarged cross sections graphically illustrate the effectiveness of the two barriers. The greater protection afforded by glass block is immediately apparent. The glass block panel, constructed of hollow, partially evacuated units,

has an insulating value of .49 BTU's* per square foot per hour per degree difference in temperature as compared to 1.13 BTU's for the single glazed sash. Obviously, with nearly a 60% reduction in the heat lost through the common window, the use of glass block will lower fuel cost and the cost of heating equipment. Insulux Glass Block construction is air-tight and does not permit loss of heat by air leakage or infiltration—a condition which is sometimes particularly bad when windows are old and in a poor state of repair.

*This value applies to smooth faced blocks; greater insulating value of .46 BTU's for rib faced blocks.

FI

The diagrammatic building below may be used as an illustration
to show the savings which can be accomplished by the use of
Insulux glass block when compared to ordinary factory sash.
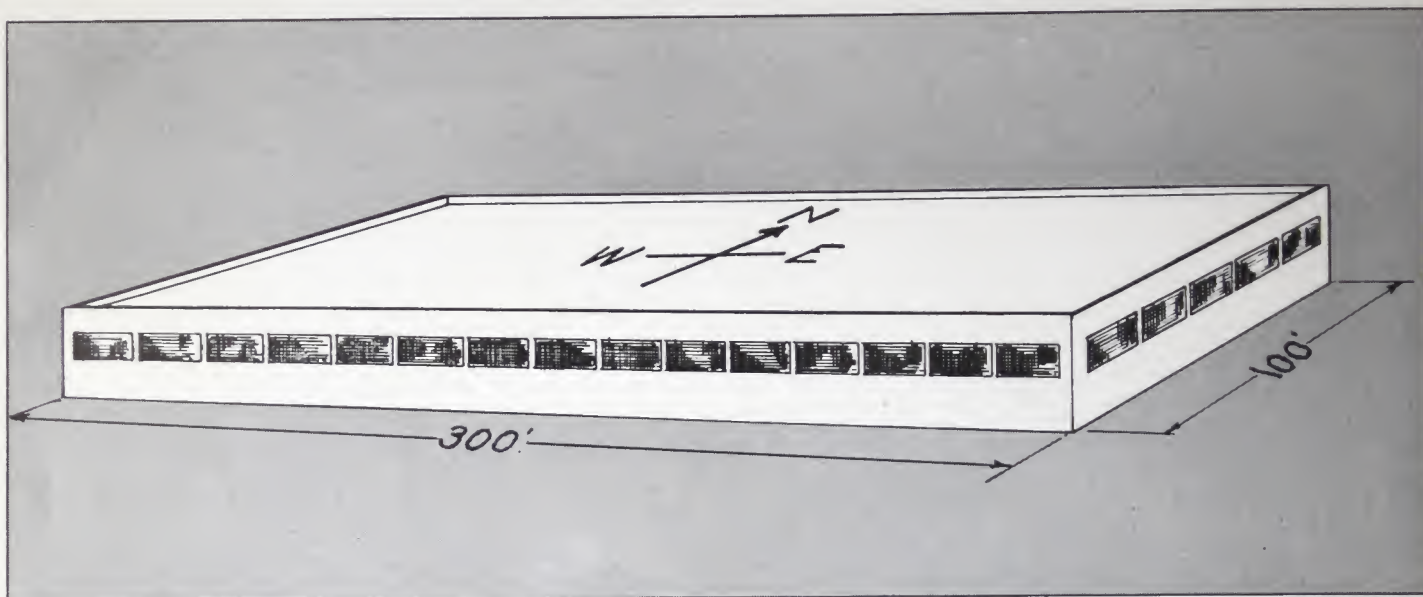
It is assumed that this building has a total of 4800 sq. ft. of glass area on all four exposures. If we wish to maintain an inside temperature of 70° with an outside zero (0°) temperature, our heating requirements must be based on a spread of 70°—the difference between the inside and outside readings.

Since ordinary single glazed sash has a U value of 1.13 BTU's per square foot of glass each hour for each degree of temperature difference between inside and outside, at a wind velocity of 15 miles per hour—we figure thus: 4,800 (sq. ft. glass area) x 70 (temperature difference) x 1.13 (U value) = 379,680 BTU's lost per hour through

ordinary window sash. That is the equivalent of 1582 sq. ft. of radiation based on 240 BTU's per sq. ft.

Comparing, then, the results obtained as shown in the table below, we find that the heat loss through block is much less than through a window. This means a saving in fuel as well as in the original cost of the heating equipment.
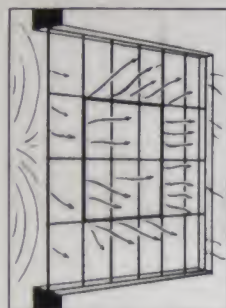
It is to be noted that in our calculations infiltration has been ignored. It is negligible with glass block, but often becomes a very important factor with windows, particularly those ventilated according to customary practice.

	Sq. Ft.	Temperature Difference	U Value*	BTU/hr. Heat Loss	Sq. Ft. of Radiation
Sash	4800	70	1.13	379680	1582
Glass Block	4800	70	.49	164640	686
Saving effected by Glass Block				215040	896

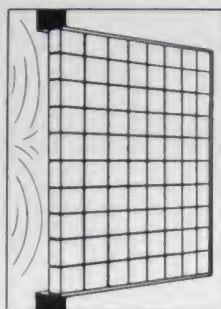Note: These figures do not consider infiltration through windows.
*This value represents the number of B T U 's transmitted per sq. ft. per hour per degree difference in temperature with a wind velocity of 15 m.p.h.

CONDITION OF DRAFTS NEAR OUTSIDE WALLS

PROBLEM 2

A problem common with windows is the infiltration of cold air, a condition that becomes worse when the window is old. These drafts cause lower inside temperatures and increase the load of heating equipment. Such a condition frequently cuts down productive floor area since the space adjacent to the windows is not usable.

How Insulux Glass Block solve this problem is shown in the two sketches at the left.

In movable sash there are many potential sources of air infiltration.

Glass Block panels are masonry walls which do not permit the passage of air currents

TEMPERATURES AND HUMIDITIES TO PRODUCE CONDENSATION

PROBLEM 3

By the use of the graphs below, one can determine outside temperatures required to produce condensation on a glass block panel or a single glazed window for various interior relative humidities and temperatures. A comparison of the examples below will show that much lower temperatures are required to produce condensation on glass block than on single glazed sash.

Insulux reduces condensation in industrial plants. While it would be difficult to secure any light transmitting material which would be 100% effective in preventing condensation, Insulux Glass Block are contributing a measure of condensation control never before possible.

	Inside Temperature	Inside Relative Humidity	Outside Temp. to Produce Humidity
SASH	65°	40%	+28°
GLASS BLOCK	65°	40%	−19°(below 0°)*
SASH	70°	60%	+49°
GLASS BLOCK	70°	60%	+21°*

Outside Temperature Required to Produce Condensation on Inside Surface of INSULUX GLASS BLOCK Wall

Outside Temperature Required to Produce Condensation on Inside Surface of SINGLE GLAZED SASH
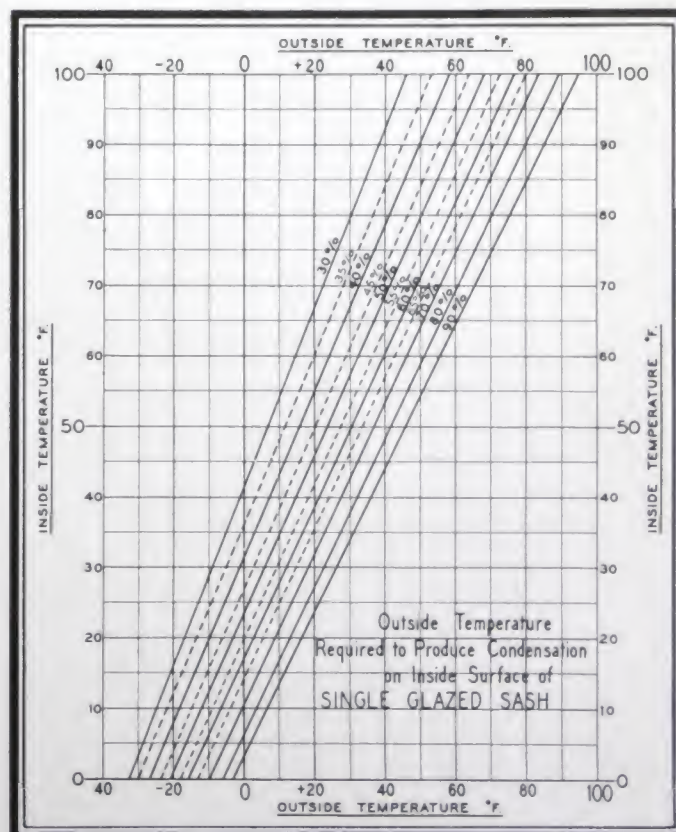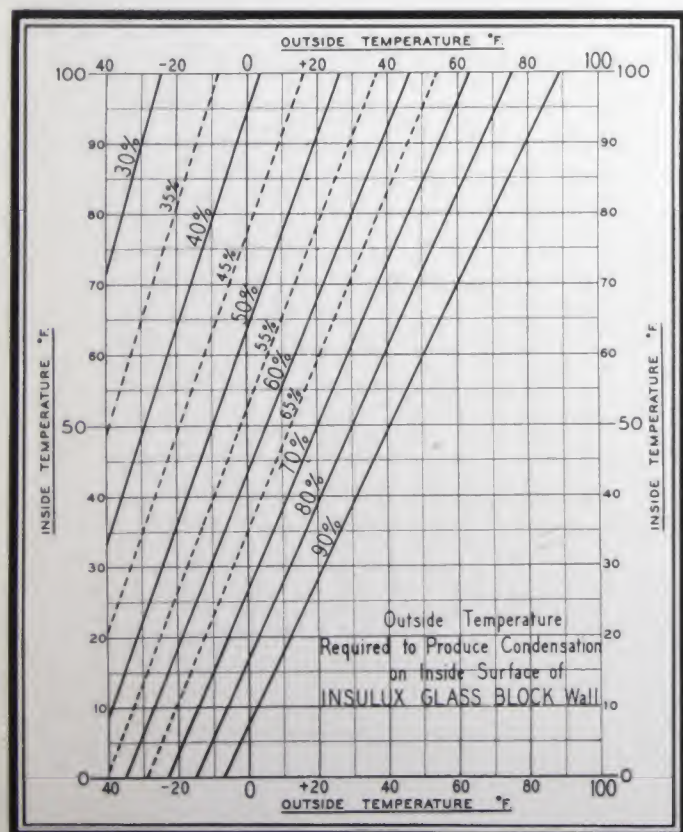
*These outside temperatures apply to smooth faced blocks (U Value .49); if rib faced blocks are used (U Value .46) temperatures to produce condensation drop from −19° (below 0°) to −24° (below 0°) and from +21° to +18° respectively.

SAVINGS EFFECTED IN COST OF COOLING EQUIPMENT AND OPERATIONS

PROBLEM 4

Insulux proves advantageous the year around! The insulating value of glass block not only reduces heat loss in winter but also reduces the heat gain in the summer and is particularly helpful in reducing cooling loads in air conditioning buildings. Consequently, glass block is finding increasing favor with engineers who value it as a light transmitting material that adapts itself well to more economical operation of air conditioning systems.
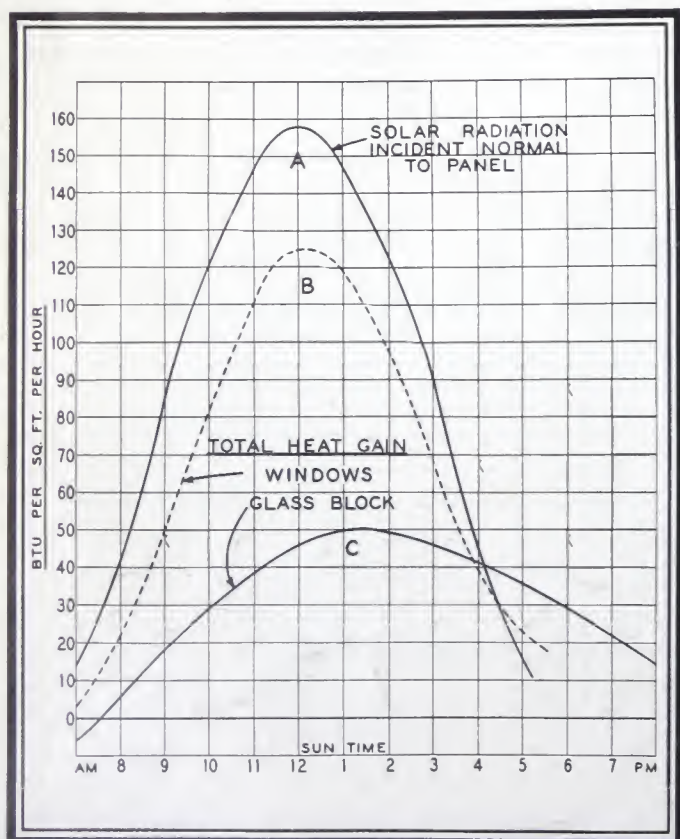
The solar heat penetration through ordinary window glass places a heavy load on cooling equipment, particularly where there are large window areas as in industrial buildings. Heat infiltration through cracks around windows further increases the load on the cooling equipment.

The accompanying curves show the comparative total solar heat transmission between a single glazed window and glass block. Curve A is the heat falling on the surface of the panel; curve B shows the heat transmitted in BTU's per sq. ft. per hr. through a window; and curve C shows that standard Insulux Glass Block transmitted only 50 BTU's—against 125 BTU's for the window—a 60% reduction in heat transmission. That means lower cooling costs with Insulux.

It should be noted that special prismatic blocks are available which transmit even less heat than those standard block shown on the graph. Information on the complete line of Insulux Glass Blocks and their application to Light and Maintenance problems may be had by writing the Owens-Illinois Glass Company, Insulux Products Division, Toledo, Ohio.

HEATING PROBLEMS IN YOUR OWN PLANT

Our engineers will be glad to make a 5-year projection of savings in operating your heating or cooling equipment, using Insulux Glass Block in place of single glazed steel sash.

Such projection will also include savings in cost of original equipment in new buildings.

If so desired, such a survey can also be made to include maintenance costs and comparative efficiency in maintaining temperature and humidity control. Write Insulux Products Division, Owens-Illinois Glass Company, Toledo, Ohio.

INSULUX GLASS BLOCK
OWENS-ILLINOIS GLASS COMPANY